

AMENDMENTS TO THE CLAIMS

Please amend claim 11, and add new claim 29, as follows.

Listing of Claims

1-10. (CANCELED)

11. (CURRENTLY AMENDED) A method of testing the bond strength of an electrically conductive ball adhered to a substrate, the method comprising the steps of:

gripping the ball with a test tool,

moving the ball in a direction substantially orthogonal to the plane of adherence of the ball while urging the substrate against the ball, [[and]]

abruptly halting the substrate, and

measuring the force required to break the ball off of the substrate.

12. (PREVIOUSLY PRESENTED) The method of testing according to claim 11 and including the preparatory step of clamping the substrate to a platen, whereby the platen is abruptly halted, thereby indirectly halting the substrate.

13. (PREVIOUSLY PRESENTED) The method of testing according to claim 11 and including the step of providing a pneumatic ram to urge the substrate against the ball, and applying air under pressure to the ram in an amount sufficient to ensure a compressive load between the ball and substrate up to the time when the substrate is abruptly halted.

14. (PREVIOUSLY PRESENTED) The method of testing according to claim 12 and including the step of providing a pneumatic ram to urge the substrate against the ball, and applying air under pressure to the ram in an amount sufficient to ensure a compressive load between the ball and substrate up to the time when the substrate is abruptly halted.

15. (CANCELED)

16. (PREVIOUSLY PRESENTED) The apparatus according to claim 27 wherein said urging apparatus comprises a pneumatic ram.

17. (PREVIOUSLY PRESENTED) The apparatus according to claim 27 wherein said urging apparatus includes a platen for the substrate.

18. (PREVIOUSLY PRESENTED) The apparatus according to claim 16 wherein said urging apparatus includes a platen for the substrate.

19. (PREVIOUSLY PRESENTED) The apparatus according to claim 17 and further including a clamp device to releasably restrain the substrate on said platen.

20. (PREVIOUSLY PRESENTED) The apparatus according to claim 18 and further including a clamp device to releasably restrain the substrate on said platen.

21. (PREVIOUSLY PRESENTED) The apparatus according to claim 16 wherein said abutment restrains the substrate by direct contact with said ram.

22. (PREVIOUSLY PRESENTED) The apparatus according to claim 27 wherein said abutment restrains the substrate by direct contact with the substrate.

23. (PREVIOUSLY PRESENTED) The apparatus according to claim 17 wherein said abutment restrains the substrate by direct contact with said platen.

24. (PREVIOUSLY PRESENTED) The apparatus according to claim 18 wherein said abutment restrains the substrate by direct contact with said platen.

25. (PREVIOUSLY PRESENTED) The apparatus according to claim 19 wherein said abutment restrains the substrate by direct contact with said platen.

26. (PREVIOUSLY PRESENTED) The apparatus according to claim 20 wherein said abutment restrains the substrate by direct contact with said platen.

27. (PREVIOUSLY PRESENTED) Apparatus for testing the strength of the bond between an electrically conductive ball and a substrate at a plane of adherence, the apparatus comprising:

a gripper for gripping a ball adhered to a substrate;

an apparatus for moving said gripper on an axis substantially orthogonal to the plane of adherence;

an urging apparatus for urging the substrate on said axis towards said gripper, said urging apparatus adapted to move the substrate and ball along said axis;

an abutment adapted to restrain the substrate while the apparatus for moving said gripper continues to move said gripper along said axis to break the ball off the substrate; and

a force measuring apparatus configured to measure the force required to break the ball off the substrate.

28. (PREVIOUSLY PRESENTED) A method of testing the strength of the bond between an electrically conductive ball and an electronic substrate at a ball-substrate interface, the method comprising the steps of:

securing the substrate to a platen;

positioning the substrate a sufficient distance from a stationary abutment to permit the substrate to be moved towards the abutment;

moving a test tool into engagement with the ball so that the test tool grips the ball;

moving the substrate and test tool in unison towards the abutment while urging the ball against the test tool and while preventing rotation of the substrate relative to the test tool;

causing the substrate to contact the abutment to abruptly halt the substrate;

continuing to move the test tool while still gripping the ball to break the ball off the substrate; and

measuring the force required to break the ball off the substrate.

29. (NEW) The method of claim 11, wherein abruptly halting the substrate comprises contacting the substrate against an abutment.